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〈論 文〉

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「能力、技能と達成度を数量化するための容易にアクセスできるオンラインの学生のスキル・タクソノミーの設計と構築について」

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Abstract

In this paper, as part of a group research project, we report on the design, construction and application of a student skills taxonomy appropriate for use in higher education. We also consider how such a taxonomy could be reasonably defined and created, with respect to the function and skills included in the taxonomy, and how it can be used as a tool to help in providing an accurate statement of student abilities and skills. As a special case, we additionally consider what criteria should be applied to express levels in a taxonomy of English language skills, and whether such a taxonomy is a realistic and accurate expression of skills, able to be expressed in a hierarchical manner. Finally, we also report on whether or not it is appropriate to motivate students by encouraging them to attain national qualifications or certification, in the belief that such qualifications make the student more attractive to the employer while acting as a statement of completed skills, or guarantee of “knowledge”.

本研究の目的は、学生のための総合的な能力分類とオンラインでの資格記録システムを開発することであった。我々が学生を送り出す社会、雇用者側からは大学新卒者の実務的なスキルレベルを知りたいという要望がある。新規卒業の新入社員に対しては、先輩社員と同様のスキルが期待されることはなくとも、雇用者側から見ると大学や専門学校の専攻分野と関連した多くの基本的なスキルを有していることは期待されている。

Key Words:

skills taxonomy, student portfolio, nationally certified examinations, skills quantification, competence, on-line skills recording system, motivation, skills descriptors

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1 Introduction

In this paper, as part of a group research project, we report on the design, construction and application of a student skills taxonomy appropriate for use in higher education. We also consider how such a taxonomy could be reasonably defined and created, with respect to the function and skills included in the taxonomy, and how it can be used as a tool to help in providing an accurate statement of student abilities and skills. We additionally consider devising a system whereby any certification obtained by the student can be maintained in an online personal database, which can easily be accessed, modified and printed out. As a special case, we examine what criteria should be applied to express levels in a taxonomy of English language skills, and whether such a taxonomy is a realistic and accurate expression of skills, able to be expressed in a hierarchical manner. Finally, we report on whether or not it is appropriate to motivate students by encouraging them to attain national qualifications or certification, in the belief that such qualifications make the student more attractive to the employer while acting as a statement of completed skills, or guarantee of “knowledge”.

As our research aimed at creating a combined skills taxonomy and the resultant online recording system, we initially need to look at exactly what a taxonomy is, and what functions it has. We also need to discuss exactly what a taxonomy expresses, in addition to who the target audience is. We begin by looking at the word itself, ways taxonomies have been and can be used, and an attempt at a definition.

2 Taxonomies

The word *taxonomy* appeared around two hundred years ago (1828), in the French language, and was predominantly used for botanical classifications. The word comes from ancient Greek *taxis*, meaning “arrangement” or “order”, and *nomia*, meaning “method”. (Houghton Mifflin, 2012). Thus the original meaning referred largely to a *method to order* things. Websters (2008) defines a taxonomy as “the science of classification; laws and principles covering the classifying of objects”.

The first common use of “skills” taxonomy in an educational context was proffered in 1956 by Benjamin Bloom in his *Taxonomy of Educational Objectives*, a six-level description of thinking, referred to as *Blooms taxonomy of cognitive skills* (1956). The taxonomy itself is a classification of educational learning objectives, instigated by a committee of educators chaired by Benjamin Bloom, the summary of which was then edited and compiled into a handbook, *Taxonomy of educational objectives: the classification of educational goals: Handbook 1: Cognitive Domain*. Despite being named after Bloom, the handbook was the summary of a series of conferences and

meetings, held over 4 years from 1949 to 1953, with the fundamental aim of improving communication between educators on the topics of syllabus design and testing.

In modern information management, the term taxonomy is used both in a similar sense to mean a hierarchical classification or categorization system, and in a more modern, systematic sense referring to any means of *organizing concepts of knowledge*. Hodge (2000) also notes the term may also be synonymous with *knowledge organization systems* or *knowledge organization structure*. Despite the terminology, as Hedden (2010) notes, the function of the taxonomy is either to index, retrieve and organize, or provide navigational abilities.

Other taxonomies are similar in their goals, with the American Psychological Association (APA, 2012) defining a taxonomy as simply the orderly classification or arrangement of a set of related concepts based upon their common factors. Bailey (1994) adds there is typically a hierarchical structure with clear rules defining the structure and components of the taxonomy. In the case of the APA, using a taxonomic approach, a set of guidelines was constructed stipulating stages and levels to reflect training in professional psychology. A taxonomy was created in recognition of the need to organize and clearly define the myriad of terms used to describe educational and training opportunities in professional psychology. Gentile's taxonomy of motor skills (1975) is an assessment tool used to evaluate the motor functionality of an individual. The resultant chart/taxonomy is typically utilized in the healthcare industry as it provides a way to assess a person's motor response and capabilities in a simple checklist format. Gagné (1974), an educational psychologist who pioneered the science of instruction in the 1940s, created a taxonomy to classify an individual's degree of learning with reference to five categories of learning, and nine levels of instruction. Reigeluth (1983) states that Gagné's taxonomy is an indispensable tool in the field of instructional design. It is also often used as a leadership tool in training teams in the corporate world (Mindtools, 2012). Fleishman (1975, 1984) has identified, described and compiled a comprehensive set of cognitive skills as a taxonomy to describe the performance of an individual carrying out a given task, describing some 52 human abilities ranging from verbal comprehension to selective attention. They all provide a method to order information.

3 Educational Taxonomies in Education

Looking at the above taxonomies and the reason for their application to describe various abilities or contained items, we can contemplate the appropriateness of such an application in a higher education setting. While the range of examples above is broad, with taxonomies including such items as *skills*, *objectives* and even *knowledge*, there are three fundamental commonalities

which we would like to use to define a taxonomy and its application in an educational context.

Firstly, as per the Greek roots of the word (*taxis + nomia*), a taxonomy should be thought of as a *method* of placing things in *order*. The “things” to be ordered in our research are skills that an individual who has completed higher education would be expected to have. This includes both practical high level skills and more complex abstract thinking skills.

Secondly, most (but not all) taxonomies are hierarchical in structure. Marzano (2000) criticized Bloom’s hierarchical structure, a model which implies that each higher skill is composed of the skills beneath it, arguing that evidence proves this is simply not true in the cognitive processes, that moving from the simplest level of knowledge to the most difficult level of evaluation, is not supported by research. While it is difficult to justify any skills taxonomy being totally vertical in structure, most skills taxonomies are based on the concept of mastering a simple skill before progressing to the next more complex one. While Marzano’s comment concerning cognitive processes may be valid, breaking down tasks into simple steps by task analysis (Thollar, 1985) shows that completion of simple challenges successfully leads to the ability to perform more complex assignments. This is borne out by the adage that you have to learn to crawl before you can walk. Consequently, it is reasonable to assume that in a taxonomic expression of skills that higher education students are expected to have, a hierarchical structure is appropriate.

Thirdly, of the taxonomies discussed above, the motivation to create such taxonomies, or the purpose of their application to a challenge or problem is a result of a top-down needs analysis. Looking at a few examples ably demonstrates this point. In the case of the APA (2012), the purpose of the taxonomically constructed guidelines was to provide a consistent set of terms and definitions related to education and training in the American Psychological Association. Fleishman (1975) wished to develop and evaluate systems to describe and classify tasks which could improve predictions about human performance. Gentile’s (1975) taxonomy is used in healthcare, to classify patients. The intent of Bloom (1956) and his colleagues was to develop a method of classifying thinking behaviors considered important in learning processes, thereby allowing easier and more effective communication between educators on discussion concerning curriculum and examination design. Taxonomies are thus used to allow classifications to be made with an external motive, with the beneficiary tending to be those outside the taxonomy.

Combining these commonalities, we initially define a taxonomy of skills in an educational sense as a method of ordering appropriate higher education skills in a hierarchical structure for the benefit of those other than the student, namely potential employers, evaluators (teachers) and even parents. We would, however, like to add one additional feature which does not seem to exist in

other hierarchical taxonomies; that is, the relevance and the importance of the taxonomy to the individual being evaluated. If a taxonomy accurately lists practical and academic skills or abilities, utilizing the taxonomy as not just a guarantee for potential employers, but a type of motivational checklist for the student. In the ARCS model, Keller (1987, 1988) argues that the student's recognizing the relevance and importance of the learned material (i.e. obtained qualifications) would likely promote satisfaction, and inspire the student to master further skills, expressible here as qualifications or certificates. Including this important motivational factor, a taxonomy of skills for higher education students can thus be redefined as a method to hierarchically record appropriate academic and practical skills that can be objectively, functionally or quantitatively expressed for the benefit of those wishing to evaluate the subject while simultaneously serving as an individual learning portfolio.

As noted, skills appropriate to such a taxonomy would be those that could be objectively tested and expressed. This would apply to national qualifications and nationally recognized certificates. (The words are used interchangeably.) Unlike many other countries, Japanese curriculum vitae typically include any licenses or qualifications obtained, attesting to the social acceptance and status of such qualifications, and validating their inclusion into an educational skills taxonomy. Worldwide, as few as 25% of employers (Hart Research Associates, 2010) think universities are doing a good job in preparing graduates for the workplace. Furthermore, only 10% thought colleges did an excellent job (Johnson, 2011). Clearly, there is a disparity between what universities are teaching and what employers want. A degree or diploma will give an indication of what and where the student has studied, and a GPA will provide an idea of how well they have studied, but a taxonomy of skills, including nationally recognized qualifications or certificates will offer a quantifiable record of that student's capability.

4 Existing Taxonomies in Education

Thus it can clearly be seen that taxonomies are an appropriate way to consider expressing skills that should be taught or developed in higher education. Taxonomies have in fact been applied to education in various ways for various motives. Before further elaborating on our system, three examples deserve mention.

In 2010, the European Commission's Directorate General for Employment, Social Affairs & Inclusion (ECDGESAI) (2010) announced the development of a European Skills, Competences and Occupations taxonomy (ESCO), which will describe the most necessary skills, competences and qualifications for thousands of occupations across the European Union. While not yet introduced, it

is envisaged that the taxonomy will largely be aimed at both those involved in educational institutions and the labour market. The aim of the EU is to develop the ESCO to contain job specifications and requirements for as many occupations as possible over the whole European Union. It is hoped that the new taxonomy will accurately specify all requirements for as many job profiles as can be included, benefitting both jobseekers and employers. ECDGESAI note that “it could be used to help jobseekers better describe their skill sets”. Clearly, there is a recognition that “skills sets” can be used to match employers and employees by removing much of the guesswork. It is important to note that the EU is also planning to incorporate the taxonomy into all relevant educational institutions, an acknowledgement that a record of student skills and abilities is a must for both the potential employer as well as the future job-seeker.

In 2000, Snyder (2000) released the Taxonomy of Academic Performance Indicators (TAPI), a revision of his Basic/Essential Skills Taxonomy (BEST), compiled a year earlier with the Arizona State Department of Education. The TAPI was designed to provide full coverage of core academic areas in Mathematics, Science and the Language Arts. Its purpose was to provide a “means to analyze curriculum and instructional materials and identify academic skills”. The skills are not intended as instructional content but as a descriptive skill listing to provide a base for identifying the knowledge needed for proficient skill performance. It was intended to be an extensive listing of essential concepts for each specific knowledge domain. Two hundred and eighty two language arts (English) skills were identified and numerically listed (see table 1) (6 of 282 skills listed).

Table 1 (Snyder, 2000)

014	Applies/Uses	Figures of speech	
015	Applies/Uses	Figures of speech	hyperbole
016	Applies/Uses	Figures of speech	idiomatic expression
017	Applies/Uses	Figures of speech	metaphor
018	Applies/Uses	Figures of speech	personification
019	Applies/Uses	Figures of speech	simile

While Snyder created a detailed taxonomy for use in education, listing over one thousand assessable skills, it should be noted that his purpose was distinctly different than ours. Each skill is carefully stated, allowing for the clear communication of academic skill requirements to assessment and curriculum developers. Snyder’s taxonomy undoubtedly meets this need, but does not meet ours. As noted, the purpose of our taxonomy was to not only record skills in a quantifiable, recognizable manner, but also to clearly and exactly convey mastered skills to potential employers

while motivating the subject.

Finally, it would be valuable to consider Shoemith's (2011) thoughts concerning skills taxonomies. Shoemith notes that of late, the term 'skill' has become virtually synonymous with what are known as technical and vocational education and training (TVET) programs, which she argues has fostered an assumption that skills from such program only relate to technical, non-cognitive skills. She further adds that an armory of purely technical skills will most likely not lead to success in winning jobs, just as they will do little to allow companies or employers to meet targets or goals. She continues that any taxonomic approach to describing skills, especially in an educational context, should include four types of skills, or four components. They are;

- (i) *basic skills*, such as numeracy and literacy skills, upon which other skills are built,
- (ii) *life skills*, including such things as communication skills, daily living and self care,
- (iii) *employability skills*, helping individuals become and remain active participants of the labour market, and
- (iv) *technical skills*, defined as the skills needed to work in a particular industry or business.

However, underpinning all of these skills, Shoemith stresses the necessity of impressing upon the student the importance of the ability to learn, which she calls "learning to learn". Doing so, she argues, will enable the individual to continually develop and augment their skills over a lifetime.

This consideration is of particular relevance to the formation of any skills taxonomy and will be further deliberated in the discussion section. The most obvious danger to tying skills to nationally certified qualifications, as we have done, is the individual mistakenly seeing the certificate itself as the target skill. While Shoemith noted that technical schools are often seen as producing nothing more than technical skills, the same potential threat lies with universities that put too much weight upon gaining national certification. Given that the role of universities is teach people to think critically (Palfreyman, 2008), and that a graduation certificate itself can be seen as a "license to learn" (AAC&U, 2003), it is very important to temper the desire to arm students with numerous national accredited certificates attesting to what they have achieved, as opposed to teaching critical thinking.

5 Skills Taxonomy for Higher Education Students - the HIU model

Our research aimed at creating a combined skills taxonomy for higher education, and a related on-line recording system. As noted, there is a perceived need that society (employers) want to know what new graduates are capable of doing. The graduation certificate only reflects the broad

area of study and the student's *alma mater*. While it is highly likely that new members of the workforce in any company or enterprise will not be as experienced as workers with longer histories, there is nevertheless an expectation by employers that new workers should be capable of a number of basic skills, implied by, and according to their area of study at university or technical college. To this end, a taxonomy of skills expressed by nationally certified qualifications, diplomas or licenses would help assuage the fears of prospective employers. Also, as noted earlier, attaining such certification would likely motivate students to continue studying to obtain further skills.

Using the premise that one of the best ways for new workers to demonstrate their potential, capability and employability is by quantifiable nationally accepted licenses, we proceeded to (1) create a skills taxonomy appropriate for higher education, (2) constructed an on-line recording system, to enable easy access and monitoring by the student or others, (3) investigated the relevance of collecting national qualifications and their relationship to gaining employment, and (4) also considered the concept of “qualification collecting” from the student perspective.

The model which we proposed is intended to cover as many higher education skills as possible. As of March 2012, treating the grade, or “*kyuu*” of the examinations separately, Hokkaido Information University encourages students to try to obtain as many as forty two separate nationally recognized qualifications, as listed in the HIU Qualification Acquisition Handbook (HIU, 2012) (See fig 1). While obtaining all would be virtually impossible, due to the different specialities involved, such qualifications range from IT Passport, to Medical Management Consultant, to Accredited CAD Engineer, to Accredited Web designer. While not strictly recognized on a national basis, further qualifications such as Microsoft Office Specialist, for example, would serve as proof to an employer, or even teacher, that a student is capable of ably operating all components of the Microsoft Office package. Even a third grade (3 *kyu*) in the *Eiken* English Language proficiency test would tell any prospective hiring business that the holder of the qualification was able to read, write and conduct elementary English conversation at the level taught up to the end of junior high school. It should be noted, however, that in the case of language certification in particular, exact skills are not clearly delineated, which creates a problem to be addressed in the next section.



Nevertheless, certificates or qualifications can be considered as a virtual guarantee of the acquisition of a set of skills. Our idea is to use such qualifications in a taxonomy as an expression of gained competences. Put syllogistically, industry wants suitably qualified workers, having more

certificates makes the applicant more employable, therefore studying for certification will make the student more employable.

A taxonomy has been defined as a simple list or classification of what a person is able to do, allowing their ability to be quantitatively classified, or numerically ranked. However, potential difficulties can emerge when qualifications do not actually allow the skills to be quantitatively expressed. As noted above, this is the case with many English language qualifications. While such things as *Eiken*, *TOEIC* or *TOEFL* amongst others are very popular in Japan, they do not provide any descriptors. Having a 2 *kyuu* in *Eiken* or 600 points in *TOEIC* tells us that the student is clearly able to speak English, but does not tell us to what the student can do. This is the employer's dilemma, and largely what we were trying to avoid by developing this taxonomy. We have no idea exactly what an *Eiken 2 kyuu* student can, or can't do. A descriptor is necessary. In the interests of universality, we opted to apply the CEFR (the **C**ommon **E**uropean **F**ramework of **R**eference for languages; Learning Teaching and Assessment) (Tanaka et al, 2010). This framework is used on a worldwide scale, and provides a good set of descriptors for language skills in any language. It divides learners into three broad groups, *A*, *B* and *C*, which can be further divided into six levels. The *A* group represents basic users, *B* represents intermediate, and *C* represents proficient. The CEFR describes skills that the learner is supposed to be able to accomplish in reading, listening, speaking and writing at each target level. They are described in the table below (see table 2).

Table 2 (CEFR, 2011)

A1	Can understand and use familiar everyday expressions and very basic phrases aimed at the satisfaction of needs of a concrete type.
A2	Can understand sentences and frequently used expressions related to areas of most immediate relevance
B1	Can understand the main points of clear standard input on familiar matters regularly encountered in work, school, leisure, etc.
B2	Can understand the main ideas of complex text on both concrete and abstract topics, including technical discussions in his/her field of specialization
C1	Can understand a wide range of demanding, longer texts, and recognize implicit meaning.
C2	Can understand with ease virtually everything heard or read

The CEFR is both a valid and well recognized language skills description model. This is demonstrated below in table 3, where fifteen different nationally certificated bodies or recognized language training institutions are compared. Countries include Japan, the United Kingdom, Germany, France, Switzerland, Spain, Finland and the United States of America. Using the CEFR

as a language skills description model allows comparison of various tests against the common framework, thereby allowing skills to be expressed (see table 3).

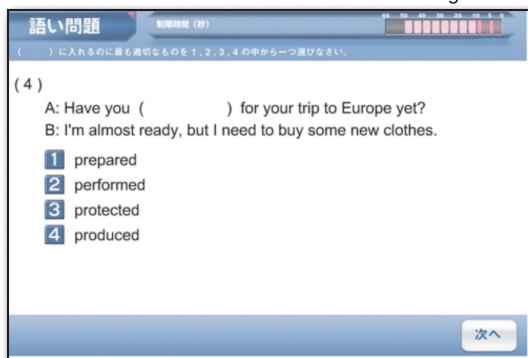
Table 3

CEFR Level	英検	ALTE level	NQF	Versant	PTE Genl (old LTE)	PTE Academic	Goethe Institute	CIEP / Alliance française diplomas	Cambridge exam	IELTS	DELE	UNICert (different languages)	TOEIC	DCL	YKI
Europe	Japan	Europe	UK	Pearson	England	Pearson	Germany	France	England	England	Spanish	Germany + Japan	US/ Japan	France	Finland
C2	—	Level 5	Level 3	79-80	Level 5	85	ZOKDS	TCF C2 / DALF C2 / DHEF	CPE	IELTS 7.5-9.0	Superior	UNICert IV	900+ points	Certification IV	6.taso
C1	1級	Level 4	Level 2	69-78	Level 4	76	Goethe-Zertifikat C1	TCF C1 / DALF C1 / DSLCF	CAE	IELTS 6.5-7.0	—	UNICert III	800 - 900 points	Certification III	5.taso
B2	準1級	Level 3	Level 1	58-68	Level 3	59	Zertifikat Deutsch für den Beruf	TCF B2 / DELF B2 / Diplôme de Langue	FCE	IELTS 5.0-6.0	Intermedio	UNICert II	650 - 800 points	Certification II	4.taso
B1	2級	Level 2	Entry 3	47-57	Level 2	43	Zertifikat Deutsch	TCF B1 / DELF B1 / CEFP 2	PET	IELTS 3.5-4.5	Inicial	UNICert I	—	Certification I	3.taso
A2	準2級	Level 1	Entry 2	36-46	Level 1	30	Start Deutsch 2	TCF A2 / DELF A2 / CEFP 1	KET	IELTS 3.0	—	—	—	Basic	2.taso
A1	3級	Breakthro'o' level	Entry 1	26-35	Level A1	—	Start Deutsch 1	TCF A1 / DELF A1	—	IELTS 1.0-2.5	Acceso	—	—	Elementary	1.taso

In this way, CEFR levels can equated to Eiken levels or even TOEIC or TOEFL scores. This is not exact, but it does allow the skills of the subject to be quantifiably expressed reasonably accurately. In our case, using *Eiken CAT (Computer Adaptive Testing)*, a feature of the Chieru e-learning student portal site, we designed appropriate content to fit the CEFR descriptors (fig 2). Tanaka et al (2010) further developed this idea into the HIU English Passport (fig 3), using the six CEFR descriptors A1 to C2 to express skill levels in various language learning areas. While not nationally accepted, such a model as proposed by Tanaka allows a precise expression of skills.

Figure 2

Figure 3



The screenshot shows the "HIU English Passport" interface. It includes a student profile with fields for Name (前田 光輝), Student number (0302056), and Date of birth (1989/02/05). Below the profile is a table showing language skills across CEFR levels A1 to C2.

英語能力		A1	A2	B1	B2	C1	C2
Understanding	聴くこと (Listening)	5.0	3.5	未定	未定	未定	未定
	読むこと (Reading)	4.5	4.2	3.3	未定	未定	未定
Speaking	やりとり (Speech Interaction)	3.3	3.0	未定	未定	未定	未定
	話すこと (Speaking)	3.5	3.5	3.2	未定	未定	未定
Writing	書くこと (Writing)	4.0	3.4	2.8	未定	未定	未定
	文法 (Grammar)	4.5	4.2	3.5	未定	未定	未定
Knowledge	語彙 (Vocabulary)	80%	50%	0%	0%	0%	0%

As noted earlier, many nationally certified exams or qualifications are skill specific, especially the more technical ones, such as Web Design Expert or CG Engineer, allowing reasonable expectations to be made about the abilities of the certificate holder. However, irrespective of whatever testing/grading/evaluation/accreditation system is used, using a framework such as that

provided by the CEFR allows exact skills to be clearly delineated and expressed where they may otherwise be unclear.

6 Going On-line - A Skills Taxonomy for Higher Education Students - the HIU model

Having discussed the design of our skills taxonomy for higher education, and the justification for such a tool, we now report on the manner in which the skills are recorded and made available to the student and/or potential employer. Integral to the creation of the skills taxonomy, we developed and constructed a very efficient on-line recording system to act as a repository of acquired, quantifiable and recognizable skills. That is, we developed the idea of storing all skills data on an easily accessible, secure computer database. Any student can log into their own page to check or record which particular (national) qualifications or what certification they have obtained. Information available would include student name, number, name of qualification obtained, level, date obtained and date entered. The student would also be able to directly print out the form. Although different in format to the online information, the printout itself could easily include the student's photo and school letterhead (see fig4). Other things (such as GPA, seminar theme etc) could easily be added. The student would most likely be motivated to try to obtain more qualifications, not unlike collecting cards, and the ease with which a statement of qualifications could easily be accessed on official school paper would help simplify the job-hunting and interview process.

Figure 4



Figures 5 and 6 show the ease with which a student could easily record, check or update skills changes. Simple drop-down menus for the year and grade of license obtained allow changes to be easily made (fig 5). The total number of certificates/licenses applicable to each department or speciality is also listed in the window, along with a check box indicating the complete, or incomplete, status of the target qualification (fig 6).

Figure 5



Figure 6



7 *The relevance of Certification to Employment - Qualification Collecting*

We obtained and scrutinized some data from another institution which gave a high priority to gaining qualifications. There was a clear and significant relation between qualifications gained, the type of employment available to people holding such qualifications, and the success that such qualification holders have in obtaining the same employment. This appears to reflect the reality of the worth of gaining or holding such certification.

The same view was expressed by past and present students, the former noting that they felt they were able to gain employment because of the qualifications which they held. The latter group, consisting of present students, were also of the opinion that holding nationally accredited licenses or qualifications would provide a significant advantage in gaining employment as they were able to demonstrate the existence and mastery of skills necessary for employment that the qualifications implied they had. A short movie was also made for PR purposes using several of the same students praising the virtues of obtaining qualifications, along with comments by Student Support (see fig 7). It seems that many students think qualifications are helpful in gaining employment. Even if that is not the case, the consequent motivation on the part of the students has some value.

Figure 7



8 *Discussion*

The motive and rationale behind the creation of a certification based skills taxonomy is sound. The advantages are numerous. As noted previously, they include increased student motivation, satisfied employers, marketable skills, better job preparedness & job matching, and a concrete list of quantifiable skills. However, there are a number of problematic issues concerning the application of nationally recognized qualifications as a way of expressing skills in a higher education oriented taxonomy. There are educational issues such as whether or not “qualification collecting” is appropriate for a university, which should be mainly targeting critical thinking skills. There is also evidence (Rowan, 2009) that students who study only for licenses in a university setting don’t want to study anything else; i.e the license is seen as more important than other non-license curricula. Dunne notes that students studying for TOEIC were loathe to do any other English study as it was seen as getting in the way of TOEIC study. Shoesmith notes that teaching for certification tends to occur concurrently with a loss of developing critical thinking skills. Utley (2005), Paton (2010) and Khalili (2009) all warn of the dangers of teaching to pass tests, which is essentially what happens if students

study purely to gain national accreditation.

Taxonomies are also problematic in that the first skills taxonomy, that posed by Bloom, is criticized by both Marzano (2000) and modified by Anderson (2001). Marzano notes that research does not support Bloom's hierarchal base (or any hierarchical base) where it is assumed that complex cognitive skills are built on simpler ones. Anderson, a former student of Bloom's, notes that nearly all complex learning activities require the use of several different cognitive skills, not just one as Bloom claims, demonstrating the difficulty of creating a vertical skills list.

Furthermore, there is the difficulty of some licenses having no descriptors, which means there is no way to specify particular skills quantifiably. While this difficulty can probably be successfully solved by application of the CEFR, the fact remains that use of nationally accredited licenses in a skills taxonomy for higher education is valuable but should be handled with caution.

9 Conclusion

It can be argued that our attempt at producing an online skills taxonomy for higher education has been successful. The online component has no problematic issues, just as the motivation of students involved in the PR film reflects the value such students perceive in obtaining nationally certified qualifications. Problems only arrive when too much focus is placed on studying for certification, leading to poor critical thinking skills, and a possible over-emphasis on technical skills. Students need to maintain a healthy balance between satisfying job market requirements, and developing further cognitive skills. Studying for certificates because they are seen as needed in the job market also has little meaning if the skills learned are not quantifiable, and therefore cannot be incorporated into a skills taxonomy to precisely demonstrate the abilities of the student. In the case of languages, a way around this dilemma was described.

If utilized in a careful, well thought-out, methodical manner, with attention paid to assuring that distinct skills are being met, our online skills taxonomy for higher education offers students in universities and colleges an excellent way to improve their employability, while providing teaching staff and potential employers with a way to categorically know that skills have been learned, developed and validated.

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